AMENDMENTS TO CLAIMS

1.   (Currently Amended) A method of forwarding a tunneled packet having a header identifying a tunnel end point and a payload, in a data communications network, comprising the steps performed at a forwarding node of:

~~for a forwarding node and a tunnel end point both in the same data communication network and both transmitting tunneled packets using the same data communication protocol:~~

receiving a notification that a tunnel ending at the tunnel end point has been constructed around a component in the data communications network;

upon receiving the notification, recording a neighbor node comprising the tunnel end point and permission to remove headers for tunneled packets to the neighbor node;

recognizing, based on routing protocol information, a tunneled packet comprising an address directly identifying ~~a~~ the neighbor node to the forwarding node as the tunnel end point;

removing the header and

forwarding the payload to the neighbor node using the address directly identifying the neighboring node and without a lookup of a forwarding address;

wherein the method is performed by one or more processors.

2.   (Canceled)

3.   (Currently Amended) A method as claimed in ~~claim 2~~ claim 1 in which the recording step comprises a manual configuration recording step.

4.   (Canceled)

5.   (Currently Amended) A method as claimed in ~~claim 4~~ claim 1, ~~further comprising the step of constructing as~~ wherein the tunnel is a repair path around ~~a~~ the component in the data communications network ~~a tunnel having a tunnel end point prior to issuing the notification from the tunnel end point~~.

6.   (Original) A method as claimed in claim 1 in which the payload is one of a further tunneled packet or a direct forwarded packet.

7.   (Original) A method as claimed in claim 6 in which the tunneled packet is configured as one of IP/GRE/MPLS/IP-payload or IP/GRE/IP/GRE/IP-payload.

8.   (Original) A method as claimed in claim 6 further comprising the step, at an originating node, of encapsulating the payload in a tunneled packet and tunneling the packet to the tunnel end point.

9.   (Currently Amended) A data storage device storing one or more sequences of instructions for forwarding a tunneled packet having a header identifying a tunnel end point and a payload, in a data communications network, which instructions, when executed by one or more processors, cause the one or more processors to perform at a forwarding node:
        ~~for a forwarding node and a tunnel end point both in the same data communication~~
                ~~network and both transmitting tunneled packets using the same data~~
                ~~communication protocol:~~
        receiving a notification that a tunnel ending at the tunnel end point has been constructed
                around a component in the data communications network;
        upon receiving the notification, recording a neighbor node comprising the tunnel end
                point and permission to remove headers for tunneled packets to the neighbor

node;

recognizing, based on routing protocol information, a tunneled packet comprising an

address directly identifying a neighbor node to the forwarding node as the tunnel

end point,

removing the header and

forwarding the payload to the neighbor node using the address directly identifying the

neighboring node and without a lookup of a forwarding address.

10.   (Currently Amended) An apparatus for forwarding a tunneled packet having a header

identifying a tunnel end point and a payload, in a data communications network,

comprising:

for at a forwarding node and a tunnel end point both in the same data communication

network and both transmitting tunneled packets using the same data

communication protocol:

one or more processors;

means for receiving a notification that a tunnel ending at the tunnel end point has been

constructed around a component in the data communications network;

means for recording a neighbor node upon receiving the notification, the neighbor node

comprising the tunnel end point and permission to remove headers for tunneled

packets to the neighbor node;

means for recognizing, based on routing protocol information, a tunneled packet

comprising an address directly identifying a neighbor node to the forwarding node

as the tunnel end point,

means for removing the header and

means for forwarding the payload to the neighbor node using the address directly

identifying the neighboring node and without a lookup of a forwarding address.

11.   (Canceled)

12.   (Currently Amended) An apparatus as claimed in ~~claim 11~~ claim 10 in which the means for recording comprises means for manually configuring recordal.

13.   (Canceled)

14.   (Currently Amended) An apparatus as claimed in ~~claim 13~~ claim 10, ~~further comprising means for constructing as~~ wherein the tunnel is a repair path around ~~a~~ the component in the data communications network ~~a tunnel having a tunnel end point in which the means for constructing the repair path is arranged to construct the repair path prior to issue of the notification from the tunnel end point~~.

15.   (Original) An apparatus as claimed in claim 10 in which the payload is one of a further tunneled packet or a direct forwarded packet.

16.   (Original) An apparatus as claimed in claim 15 in which the tunneled packet is configured as one of IP/GRE/MPLS/IP-payload or IP/GRE/IP/GRE/IP-payload.

17.   (Original) An apparatus as claimed in claim 15 further comprising means for encapsulating the payload in a tunneled packet and tunneling the packet to the tunnel end point.

18.   (Currently Amended) An apparatus for forwarding a tunneled packet having a header identifying a tunnel end point and a payload, in a data communications network, the

apparatus comprising:

one or more processors;

a network interface communicatively coupled to the processor and configured to

communicate one or more packet flows among the processor and a network; and

a computer readable non-transitory medium comprising one or more sequences of

instructions for forwarding a tunneled packet having a header identifying a tunnel

end point and a payload, in a data communications network, which instructions,

when executed by one or more processors, cause the one or more processors to

perform

at a forwarding node:

for a forwarding node and a tunnel end point both in the same data communication

network and both transmitting tunneled packets using the same data

communication protocol:

receiving a notification that a tunnel ending at the tunnel end point has been constructed

around a component in the data communications network;

upon receiving the notification, recording a neighbor node comprising the tunnel end

point and permission to remove headers for tunneled packets to the neighbor

node;

recognizing, based on routing protocol information, a tunneled packet comprising an

address directly identifying a neighbor node to the forwarding node as the tunnel

end point,

removing the header and

forwarding the payload to the neighbor node using the address directly identifying the

neighboring node and without a lookup of a forwarding address.

19.   (Currently Amended) A method of configuring a forwarding node in a data

communications network to process tunneled packets having a header identifying a

tunnel end point and a payload, comprising the steps, at a notifying node, of:

for a forwarding node and a tunnel end point both in the same data communication

network and both transmitting tunneled packets using the same data

communication protocol:

constructing as a repair path around a component in the data communications

network a tunnel having a tunnel end point prior to issuing a notification

from the notifying node;

notifying a forwarding node of the identity of the tunnel end point; and

permitting the forwarding node to process tunneled packets to the tunnel end point

by removing the header and forwarding the payload to the tunnel end point

using an address directly identifying a neighboring node and without a

lookup of a forwarding address;

wherein the method is performed by one or more processors.

20.   (Original) A method as claimed in claim 19 in which the notifying node is the tunnel end

point.

21.   (Original) A method as claimed in claim 19 in which the forwarding node is a neighbor

node to the tunnel end point.

22.   (Canceled)

23.   (Previously Presented) A data storage device storing one or more sequences of

instructions for configuring a forwarding node in a data communications network to

process tunneled packets having a header identifying a tunnel end point and a payload,

which instructions, when executed by one or more processors, cause the one or more

processors to perform

at a notifying node:

for a forwarding node and a tunnel end point both in the same data communication

    network and both transmitting tunneled packets using the same data

    communication protocol:

    constructing as a repair path around a component in the data communications

        network a tunnel having a tunnel end point prior to issuing a notification

        from the notifying node;

    notifying a forwarding node of the identity of the tunnel end point; and

    permitting the forwarding node to process tunneled packets to the tunnel end point

        by removing the header and forwarding the payload to the tunnel end point

        using an address directly identifying a neighboring node and without a

        lookup of a forwarding address.

24.   (Currently Amended) An apparatus for configuring a forwarding node in a data

communications network to process tunneled packets having a header identifying a

tunnel end point and a payload, comprising:

one or more processors;

for a forwarding node and a tunnel end point both in the same data communication

    network and both transmitting tunneled packets using the same data

    communication protocol:

    means for constructing as a repair path around a component in the data

        communications network a tunnel having a tunnel end point in which the

        means for constructing the repair path is arranged to construct the repair

        path prior to issue of a notification from a means for notifying;

means for notifying a forwarding of the identity of the tunnel end point node; and

means for permitting the forwarding node to process tunneled packets to the

tunnel end point by removing the header and forwarding the payload to the

tunnel end point using an address directly identifying a neighboring node

and without a lookup of a forwarding address.

25.   (Original) An apparatus as claimed in claim 24 in which the means for notifying is the

tunnel end point.

26.   (Original) An apparatus as claimed in claim 24 in which the forwarding node is a

neighbor node to the tunnel end point.

27.   (Canceled)

28.   (Currently Amended) An apparatus for configuring a forwarding node in a data

communications network to process tunneled packets having a header identifying a

tunnel end point and a payload, the apparatus comprises one or more processors; a

network interface communicatively coupled to the processor and configured to

communicate one or more packet flows among the processor and a network; and a

computer readable non-transitory medium comprising one or more sequences of

instructions for configuring a forwarding node in a data communications network to

process tunneled packets having a header identifying a tunnel end point and a payload,

which instructions, when executed by one or more processors, cause the one or more

processors to perform

at a notifying node:

for a forwarding node and a tunnel end point both in the same data communication

network and both transmitting tunneled packets using the same data

communication protocol:

constructing as a repair path around a component in the data communications

network a tunnel having a tunnel end point prior to issuing a notification

from the notifying node;

notifying the forwarding node of the identity of the tunnel end point; and

permitting the forwarding node to process tunneled packets to the tunnel end point

by removing the header and forwarding the payload to the tunnel end point

using an address directly identifying a neighboring node and without a

lookup of a forwarding address.

29.   (Currently Amended) A method of constructing a spanning tree from a first node in a

data communications network having as components nodes and links, around a

component, comprising the steps of:

computing the spanning tree, rooted at the first node, of available nodes which excludes

nodes reachable by traversing the component, and assigning to an available node

a positive of a cost of reaching the available node from the first node;

assigning to an available node a negative of a cost of reaching the first node from the

available node assuming that an unavailable component is available; and

re-computing the spanning tree taking into account the positive of the cost of reaching the

available node from the first node and the negative of the cost of reaching the first

node from the available node;

wherein the method is performed by one or more processors.

30.   (Previously Presented) A data storage device storing one or more sequences of

instructions for constructing spanning tree from a first node in a data communications

network having as components nodes and links, around a component, which instructions, when executed by one or more processors, cause the one or more processors to perform

computing the spanning tree, rooted at the first node, of available nodes which excludes

nodes reachable by traversing the component, and assigning to an available node

a positive of a cost of reaching the available node from the first node;

assigning to an available node a negative of a cost of reaching the first node from the

available node assuming that an unavailable component is available; and

re-computing the spanning tree taking into account the positive of the cost of reaching the

available node from the first node and the negative of the cost of reaching the first

node from the available node.

31.   (Currently Amended) An apparatus for constructing a spanning tree from a first node in a

data communications network having as components nodes and links, around a

component, comprising:

one or more processors;

means for computing the spanning tree, rooted first at the node, of available nodes which

excludes nodes reachable by traversing the component, and assigning to an

available node a positive of a cost of reaching the available node from the first

node;

means for assigning to an available node a negative of a cost of reaching the first node

from the available node assuming that an unavailable component is available; and

means for re-computing the spanning tree taking into account the positive of the cost of

reaching the available node from the first node and the negative of the cost of

reaching the first node from the available node.

32.   (Currently Amended) An apparatus for constructing a spanning tree from a first node in a

data communications network having as components nodes and links, around a

component, the apparatus comprising:

one or more processors;

a network interface communicatively coupled to the processor and configured to

communicate one or more packet flows among the processor and a network; and

a computer readable <u>non-transitory</u> medium comprising one or more sequences of

instructions for constructing the spanning tree from a first node in a data

communications network having as components nodes and links, around a

component, which instructions, when executed by one or more processors, cause

the one or more processors to perform:

computing the spanning tree, rooted at the first node, of available nodes which excludes

nodes reachable by traversing the component, and assigning to an available node

a positive of a cost of reaching the available node from the first node;

assigning to an available node a negative of a cost of reaching the first node from the

available node assuming that an unavailable component is available; and

re-computing the spanning tree taking into account the positive of the cost of reaching the

available node from the first node and the negative of the cost of reaching the first

node from the available node.